Claims

[c1]   1. Method for estimating the mass of a vehicle which is being driven on a road with varying gradient, comprising the following method steps:

– measurement of the vehicle's speed for generating input data for a calculation device;

– measurement of a variable which comprises a longitudinal force acting on the vehicle for generating input data for a calculation device;

characterized in that

said calculation device generates an estimate of the weight of the vehicle by means of a recursive process by using a statistical filter using said input data comprising the speed of the vehicle and said variable and a statistical representation of a road with varying gradient.

[c2]   2. Method according to Claim 1, characterized in that said recursive process generates simultaneous estimates of the mass of the vehicle and the gradient of the road on which the vehicle is being driven.

[c3]   3. Method according to Claim 1, characterized in that said statistical filter consists of a Kalman filter or alternatively an extended Kalman filter representing the

equation of motion of the vehicle.

[c4] 4. Method according to Claim 3, characterized in that the vehicle's speed and the gradient of the road are selected as state variables in said Kalman filter.

[c5] 5. Method according to Claim 1, characterized in that said statistical representation of the gradient of the road consists of a first order process with an intensity d and a switching frequency ω_c.

[c6] 6. Method according to Claim 5, characterized in that the size of said intensity d and the switching frequency are updated on the basis of information concerning the gradient of the road generated from said recursive process.

[c7] 7. Method according to Claim 1, characterized in that said parameter comprising a longitudinal force component is calculated from an estimate of torque delivered from an engine in said vehicle.

[c8] 8. Method according to Claim 7, where said engine consists of an internal combustion engine, characterized in that said delivered torque is estimated on the basis of information concerning the amount of fuel supplied to the combustion chamber of the internal combustion engine and the operating speed of the internal combustion engine.

[c9]   9. Method according to Claim 7, characterized in that said delivered torque is estimated from a torque sensor placed in association with the vehicle's transmission line.

[c10]   10. Method according to Claim 7, characterized in that said horizontal force component is calculated from said delivered torque and information concerning the current gearing between the drive shaft from the internal combustion engine and the vehicle's current driving wheels.

[c11]   11. Method according to Claim 1, characterized in that said parameter comprising a horizontal force component is estimated using an accelerometer which measures the acceleration in the longitudinal direction of the vehicle.

[c12]   12. Method according to Claim 1, characterized in that information regarding the mass of the vehicle is used for the apportionment of braking force between brakes in the vehicle's tractor unit and trailer.

[c13]   13. Method for estimating the gradient of a road on which a vehicle is being driven, comprising the following method steps:
– measurement of the vehicle's speed for generating input data for a calculation device;
– measurement of a variable which comprises a longitudinal force acting on the vehicle for generating input

data for a calculation device;

characterized in that

said calculation device generates by means of a recursive process an estimate of the gradient of the road on which the vehicle is being driven, by using a statistical filter using said input data comprising the vehicle's speed and said variable and a statistical representation of a road with varying gradient.

[c14]   14. Method according to Claim 13, characterized in that said statistical filter consists of a Kalman filter or alternatively an extended Kalman filter representing the equation of motion of the vehicle.

[c15]   15. Method according to Claim 14, characterized in that the vehicle's speed and the gradient of the road are selected as state variables in said Kalman filter.

[c16]   16. Method according to Claim 13, characterized in that said statistical representation of the gradient of the road consists of a first order process with an intensity d and a switching frequency ω_c.

[c17]   17. Method according to Claim 16, characterized in that the size of said intensity d and the switching frequency ω_c are updated on the basis of information concerning the gradient of the road generated from said recursive

process.

[c18] 18. Method according to Claim 13, characterized in that said parameter comprising a longitudinal force component is calculated from an estimate of torque delivered from an engine in said vehicle.

[c19] 19. Method according to Claim 18, where said engine consists of an internal combustion engine, characterized in that said delivered torque is estimated on the basis of information concerning the amount of fuel supplied to the combustion chamber of the internal combustion engine and the operating speed of the internal combustion engine.

[c20] 20. Method according to Claim 18, characterized in that said delivered torque is estimated from a torque sensor placed in association with the vehicle's transmission line.

[c21] 21. Method according to Claim 18, characterized in that said horizontal force component is calculated from said delivered torque and information concerning the current gearing between the drive shaft from the internal combustion engine and the vehicle's current driving wheels.

[c22] 22. Method according to Claim 13, characterized in that said parameter comprising a horizontal force component is estimated using an accelerometer which measures the

acceleration in the longitudinal direction of the vehicle.

[c23] 23. Method according to Claim 13, characterized in that information regarding the mass of the vehicle is used for the apportionment of braking force between brakes in the vehicle's tractor unit and trailer.